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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/692,762	ARMSTRONG ET AL.	
	Examiner	Art Unit	
	JUNE HWU	1661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 April 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,7,8,10-14,17-22,26,27,31-33,35-41,43-45,49-52 and 54* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,7,8,10-14,17-22,26,27,31-33,35-41,43-45,49-52 and 54* is/are rejected.

7)☒ Claim(s) *7 and 20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 21, 2008 has been entered.

Status of the Claims

Claims 2-6, 9, 15-16, 23-25, 28-30, 34, 42, 46-48, 53 and 55-58 are cancelled and claims 1,7-8, 10-14, 17-22, 26-27, 31-33, 35-41, 43-45, 49-52 and 54 will be examined on the merits.

The rejection of claim 1 under 35 U.S.C. 102(b) as being anticipated by Finer (Canadian Patent 1,309,367) is withdrawn due to Applicants' amendment to the claim.

The rejection of claim 1 under 35 U.S.C. 102 (b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Smith et al (In Vitro, vol. 13, no. 5, 1977, pp. 329-334) is withdrawn due to Applicant's amendment to the claim.

Objections to the Claims

Claims 7 and 20 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 1 is drawn to a method of inducing formation of regenerable embryogenic cotton callus tissue comprising transforming a non-embryogenic cotton callus tissue with an

exogenous nucleic acid sequence. Claim 7 is drawn to the inducing the formation of regenerable embryogenic cotton callus tissue wherein the non-embryogenic cotton callus tissue is transformed. No limitation is recited in the claim. Thus, claim 7 fails to further limit claim 1.

Claim 20 is drawn to a method of culturing transformed regenerable non-embryogenic cotton callus tissue comprising culturing the callus tissue containing an antioxidant and an ethylene inhibitor under dark lighting condition to induce regenerable embryogenic calli. Claim 26 is drawn to regenerable non-embryogenic cotton callus tissue wherein the non-embryogenic cotton callus tissue is transformed. No limitation is recited in the claim. Thus, claim 26 fails to further limit claim 20.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 14, and 17-19 remain rejected and claim 7 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Dependent claims are included in all rejections.

Neither the instant specification nor the originally filed claims appear to provide support for the phrase "regenerable embryogenic callus tissue" in claims 1 and 14. The specification states, "formation of embryogenic cotton callus" on p. 4, line 20 and "any regenerable cotton tissue" on p. 15, line 18. Thus, neither the instant specification nor the originally filed claims

appear to provide support for the phrase "regenerable embryogenic callus tissue" in claims 1 and 14.

Applicants urge that the specification does not use the precise sequence of terms "regenerable embryogenic callus tissue" but the subject matter is fully described in the specification and points to pp. 32-33 of the instant specification (pp. 7-8 of response).

This is not found persuasive because the specification at pp. 32-33 describes that embryos were induced; then transferred to embryo maturation media; then transferred to germination media; and after germination transferred to a larger container for further development into plants. This passage of the specification does not describe the regenerable embryogenic cotton callus tissue. Moreover, Example 1 of the specification on p. 24 bridging to p. 25 describes that hypocotyls were cut and pieces of the hypocotyls were inoculated with *Agrobacterium*. There was no mention of regenerable embryogenic cotton callus tissue that was induced from non-embryogenic cotton callus tissue.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Finer (Canadian Patent 1,309,367) in view of Rangan et al (U.S. Patent No. 5,834,292, 1998).

The claims are drawn to a method of inducing the formation of regenerable embryogenic callus tissue from non-embryogenic cotton callus tissue derived from hypocotyl comprising culturing said non-embryogenic cotton tissue with an exogenous nucleic acid sequence and culturing the transformed non-embryogenic cotton callus tissue in medium under dark lighting condition (0 μEinsteins $m^{-2}sec^{-1}$) to obtain regenerable embryogenic callus tissue therefrom.

Finer teaches a method of producing pro-embryonic cotton cell masses that are capable of regenerating into mature embryos, plantlets and whole plants (abstract and p. 3, lines 26-28). The explant used for the induction of cotton callus was hypocotyl (p. 4, last par. and p. 5, 2nd par.). The callus formed may be unorganized or may contain pro-embryonic cell masses, embryogenic callus and/or embryos (p. 7, 5th par.). The callus may be induced in the dark (p. 8, 1st par.). The development of the callus is placed in a liquid medium to promote development of pro-embryonic or proliferating embryonic cell masses (p. 8, 2nd par.) and may be cultured under dark light condition (p. 9, 2nd par.). The pro-embryonic cell masses are transferred to a liquid medium with auxin and may be cultured under dark condition (p. 10, 4th par.). The pro-embryonic cell masses are placed in a medium that induces the development of the mature embryo (p. 11). These embryos may be cultured under dark condition (p. 12, 3rd par.). The embryos are maintained in developing medium until the embryos have matured into torpedo or mature states (p. 12, 4th par.). The matured embryos are placed in a solid medium for germination and once germinated the plantlets are transferred to soil for further growth into plants (p. 14, 1st par.).

Finer does not teach the transformation of callus tissue.

Rangan 1998 teach a method of transforming cotton callus, wherein the callus is placed in a medium containing *Agrobacterium* for 1 minute to 24 hours. The callus was removed and incubated in callus growth medium. After incubation the developing callus was transferred to MS medium supplemented with NAA, cefotaxime and kanamycin. The transformed callus was selected (col. 26, lines 27-43). The results of the transformation of the cotton species to plants are shown in Example 26.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the method of inducing the formation of regenerable embryogenic cotton callus tissue from hypocotyl under dark lighting condition as taught by Finer and to combine that method by transforming the callus tissue as taught by Rangan 1998. One of ordinary skill in the art would have been motivated to do so given that cotton is an important agriculture crop. Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of transforming non-regenerable embryogenic cotton callus under dark lighting condition as taught by Finer and Rangan 1998 because dark lighting condition would be a choice of experimental design and is considered within the purview of the cited prior art. Moreover, culturing callus tissue under dark lighting condition would prevent the greening of the callus tissue. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Claims 8 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Firoozabady et al (In Vitro Cell. Dev. Biol. 299:166-178, 1993) in view of Davis et al (*In Vitro* vol. 9, no. 6, 1974, pp. 395-398).

The claims are drawn to a method of inducing embryogenic calli from regenerable non-embryogenic cotton callus tissue comprising culturing cotton callus tissue in an embryo inducing medium containing antioxidant (ascorbic acid) to promote embryogenesis.

Firoozabady 1993 teach that non-embryogenic cotton callus derived from cotyledon and hypocotyls tissues (p. 166, right col. last paragraph) were cultured in media under complete darkness and different light intensity (9 to 90 μE m^{-2} s^{-1})(p. 169, right col. last paragraph). For embryogenic callus formation and proliferation, Firoozabady et al noted that high temperature and low light were preferred for some cotton cultivars (p. 169 bridging to p. 170). After somatic embryos were formed high lighting conditions favored the germination and development of plantlets (p. 170, left col.) The embryogenic cultures were stable and somatic embryos were produced, which eventually regenerated into plants (p. 171, right col. 1st full paragraph).

Firoozabady 1993 do not teach culturing regenerable non-embryogenic cotton callus tissue, wherein the embryo inducing medium contains ascorbic acid and antioxidant.

Davis et al teach a method of culturing cotton (*Gossypium hirsutum*) callus derived from leaf explant (p. 395, left col., 2nd paragraph) in medium containing 5 mg/l of ascorbic acid (p. 395, right col., lines 9-10), which is between about 1 mg/L and 1000 mg mg/L. The cotton callus formed within 36 days when 5 mg of ascorbic acid was added to the LS medium (p. 396, right col. 1st full paragraph).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the method of inducing embryogenic calli from non-embryogenic cotton callus tissue as taught by Firoozabady 1993 and to combine that method by supplementing the culture medium with ascorbic acid as taught by Davis. One of ordinary skill in the art would have been motivated to do so given that the addition of ascorbic acid enhanced the growth of the callus as taught by Davis (p. 397, right col., 1st full par.). Furthermore, one of ordinary skill in the art

would have a reasonable expectation of success in the combination of Firoozabady et al (1993) and Davis because Davis had taught that ascorbic acid enhanced the growth of cotton callus tissue and without ascorbic acid the callus tissue would become dark pigmented (p. 396, right col., 1st full par.) and thus the addition of ascorbic acid would be a choice of experimental design and is considered within the purview of the cited prior art. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Applicants urge that Davis does not relate to growth of regenerable or embryogenic callus or to culturing callus in an embryo-inducing medium (p.14 of response).

This is not found persuasive because Davis was combined with Firoozabady 1993 to show that it would have been obvious to add ascorbic acid to the embryo inducing medium for embryogenic callus induction. Davis had noted that ascorbic acid reduce the formation of black pigments in the callus tissue.

Applicants urge that Davis that the term "regeneration" is used in the context of undifferentiated callus maintenance and proliferation in view of removal of portions of tissue from a culture maintained for callus growth and not to regeneration of plant by inducing formation of an embryo (pp. 14-15 of response).

This is not found persuasive because Firoozabady 1993 taught a method of inducing regenerable non-embryogenic cotton callus tissue and Davis was combined to show the benefits of supplementing ascorbic acid for the culture medium.

Applicants urge that claims 8 and 10-12 do not relate to growth of callus tissue but to the growth of embryogenic callus tissue in an embryo inducing medium and that there is a distinction between cotton callus cell culture and cotton embryogenic callus cell culture (p. 15 of response).

This is not found persuasive because it would have been obvious to supplement the embryo inducing medium with ascorbic acid because ascorbic acid is an antioxidant that is known to prevent the oxidation of phenols.

Applicants urge that the Davis reference had not successfully grown embryogenic cotton cells or cotton cells that were regenerable (p. 15 of response).

This is not found persuasive because the rejection is based on a combination of references, Firoozabady 1993 in view of Davis. Firoozabady 1993 taught inducing embryogenic calli from regenerable non-embryogenic cotton callus tissue and Davis taught that callus tissue medium is supplemented with ascorbic acid to prevent black pigmentation of callus tissue.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Firoozabady 1993 in view of Davis et al as applied to claims 8 and 10-12 above, and further in view of Rangan 1998.

The claims are drawn to a method of inducing embryogenic calli from regenerable non-embryogenic cotton callus tissue comprising culturing cotton callus tissue in an embryo inducing medium containing antioxidant (ascorbic acid) to promote embryogenesis, wherein the regenerable non-embryogenic cotton callus tissue is transformed.

The teachings of Firoozabady 1993 in view of Davis et al are discussed above.

Firoozabady 1993 in view of Davis et al do not teach that the regenerable non-embryogenic cotton callus tissue is transformed.

The teachings of Rangan 1998 are discussed above.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the method of inducing embryogenic calli from regenerable non-embryogenic cotton callus tissue comprising culturing cotton callus tissue in an embryo inducing medium

containing antioxidant (ascorbic acid) to promote embryogenesis as taught by Firoozabady 1993 in view of Davis and to combine that method with the transformation of regenerable non-embryogenic cotton callus tissue as taught by Rangan 1998. One of ordinary skill in the art would have been motivated to do so given that genetic transformation would provide new cotton crops that would be resistant to pest, diseases and other environmental conditions. Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of methods taught by Firoozabady 1993 in view of Davis and further in view of Rangan 1998 because Rangan 1998 had taught that cotton callus tissues were transformed (see Example 26) and thus would be a choice of experimental design and is considered within the purview of the cited prior art. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Claims 14, 17 and18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Firoozabady 1993 in view of Chi et al (Plant Cell Reports (1990) 9: 195-198).

The claims are drawn to a method of inducing the formation of regenerable embryogenic cotton callus tissue comprising culturing non-embryogenic cotton callus tissue in a medium containing aminoethoxyvinylglycine (AVG) to induce the formation of embryogenic cotton callus.

The teachings of Firoozabady 1993 are discussed above.

Firoozabady 1993 does not teach supplementing the callus tissue medium with AVG to induce the formation of embryogenic cotton callus.

Chi et al teach that AVG enhanced shoot regeneration from cotyledons of *Brassica*, a dicot. Cotyledons and hypocotyls of *Brassica* were excised and cultured on medium containing 20 µM AVG (p. 195 right col. last paragraph to p. 196, left col., line 4 and Table 1), which is between about 1 mM and 100 mM. Chi et al noted that there had been evidence that ethylene

effected growth and differentiation of plant cells and tissues and that ethylene inhibition enhanced plant regeneration of *Nicotiana* and *Triticum*, increased protoplast growth of *Solanum*, promoted embryo production in anther cultures of *Brassica* and somatic embryogenesis of *Daucus* (p. 195, left col.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the method of inducing regenerable non-embryogenic cotton callus tissue as taught by Firoozabady 1993 and to modify that method by the addition of AVG as taught by Chi. One of ordinary skill in the art would have been motivated to combine Firoozabady (1993) and Chi because Chi taught that dicot plants were able to regenerate with the addition of AVG (p. 198, left col., 1st full paragraph). Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Firoozabady 1993 in view of Chi because supplementing the cotton callus tissue medium with AVG would be a choice of experimental design and is considered within the purview of the cited prior art. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Applicants urge that Chi does not teach the formation of embryogenic cotton callus and that *Brassica* species are not related to cotton species (p. 16 of response).

This is not found persuasive because one cannot show non-obviousness by attacking the references individually where the rejection is based on a combination of references.

Applicants urge that Chi states on p. 197 that "The effect of AVG and $AgN0_3$ on shoot regeneration varies with genotype and explant source" and therefore one of skill in the art would not have had any expectation of success (p. 17 of response).

This is not found persuasive because the rejection is based on a combination of references. It would have been a design choice to use AVG with cotton plants knowing that AVG has an effect of tissue culture whether the plants are monocots or dicots.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Firoozabady 1993 in view of Chi et al as applied to claims 14, 17 and 18 above, and further in view of Rangan 1998.

The claims are drawn to a method of inducing the formation of regenerable embryogenic cotton callus tissue comprising culturing non-embryogenic cotton callus tissue in a medium containing aminoethoxyvinylglycine (AVG) to induce the formation of embryogenic cotton callus, wherein the regenerable non-embryogenic cotton tissue is transformed.

The teachings of Firoozabady 1993 in view of Chi et al are discussed above.

Firoozabady 1993 in view of Chi et al do not teach that the regenerable non-embryogenic cotton tissue is transformed.

The teachings of Rangan 1998 are discussed above.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the method of inducing embryogenic calli from regenerable non-embryogenic cotton callus tissue comprising culturing cotton callus tissue in an embryo inducing medium containing antioxidant (ascorbic acid) to promote embryogenesis as taught by Firoozabady 1993 in view of Chi and to combine that method with the transformation of regenerable non-embryogenic cotton callus tissue as taught by Rangan 1998. One of ordinary skill in the art would have been motivated to do so given that genetic transformation would provide new cotton crops that would be resistant to pest, diseases and other environmental conditions. Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in

the combination of methods taught by Firoozabady 1993 in view of Chi and further in view of Rangan 1998 because Rangan 1998 had taught that cotton callus tissues were transformed (see Example 26) and thus would be a choice of experimental design and is considered within the purview of the cited prior art. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Claims 20-22, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Finer in view of Rangan 1998, further in view of Davis and further in view of Chi.

The claims are drawn to a method of culturing transformed regenerable non-embryogenic cotton callus tissue, wherein the callus tissue is derived from hypocotyl in a medium containing AVG and ascorbic acid under dark lighting conditions to induce regenerable non-embryogenic calli.

The teachings of Finer in view of Rangan 1998 are discussed above.

Finer in view of Rangan 1998 do not teach that the medium is supplemented with AVG and ascorbic acid.

The teachings of Davis are discussed above.

The teachings of Chi are discussed above.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the method of culturing transformed regenerable non-embryogenic cotton callus tissue under dark lighting condition as taught by Finer in view of Rangan 1998 and to combine that method by adding ascorbic acid as taught by Davis and also adding AVG as taught by Chi. One of ordinary skill in the art would have been motivated to do so given that the addition of ascorbic acid reduced the formation of black pigments in callus and that AVG has shown that without ethylene inhibitor the explants were poorly regenerative (p. 197, right col. 3rd full par.).

Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of methods as taught by Finer in view of Rangan 1998 and further in view of Davis and Chi because the addition of ascorbic acid and ethylene inhibitor would be a choice of experimental design and is considered within the purview of the cited prior art. Moreover, it is noted by Chi that the addition of AVG aided plant regeneration and ascorbic acid prevented browning of the callus tissue as taught by Davis. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Claims 31-33 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Finer in view of Rangan 1998, in view of Davis, and further in view of Chi as applied to claims 20-22, 26, and 27 above, and further in view of Firoozabady et al (Plant Molecular Biology 10: 105-116, 1987).

The claims are drawn to a method of culturing transformed regenerable non-embryogenic cotton callus tissue in medium containing antioxidant (ascorbic acid) and ethylene inhibitor (AVG) under dark lighting conditions of 0 μEinsteins m^{-2} sec^{-1} to produce transgenic embryogenic cotton tissue and culturing the transgenic embryogenic cotton tissue on embryo maturation medium with a support matrix, such as filter paper.

The teachings of Finer in view of Rangan 1998, in view of Davis, and further in view of Chi are discussed above.

Finer in view of Rangan 1998, in view of Davis, and further in view of Chi do not teach that the support matrix is filter paper.

Firoozabady 1987 teach that cotyledon tissues may be placed on filter paper for transformation of callus tissue (p. 107, right col. 2nd paragraph).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the teachings of culturing transgenic cotton embryos as taught by Finer in view of Rangan 1998, in view of Davis, and further in view of Chi et al and to modify that method by using filter paper as the support matrix as taught by Firoozabady et al 1987. One of ordinary skill in the art would have been motivated to do so given that filter paper is another form of support matrix used in tissue culture. Moreover, one of ordinary skill in the art at the time the invention was made would use the method of culturing transgenic cotton callus tissue grown under dark lighting conditions and the addition of ascorbic acid and AVG as taught by Finer, in view of Rangan 1998, in view of Davis, and further in view of Chi and to combine that method by using filter paper as the support matrix because Firoozabady 1987 states that the use of filter paper in transformation reduces bacterial over growth on plant tissue (p. 107, right col. 2nd paragraph). Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Claims 36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Strickland (U.S. Patent No. 5,846,797) in view of Rangan (U.S. Patent No. 5,244,802, 1993).

The claims are drawn to a method of culturing regenerable transgenic embryogenic cotton tissue in medium containing an amino acid hydrolysate supplement.

Strickland teach a method of transforming regenerable cotton tissue (abstract and claim 1). Strickland taught that hypocotyls were excised and cut into sections and placed on sterile filter paper containing callus initiation medium (col. 9, lines 5-10). After several weeks the embryogenic callus was identified (col. 9, lines 37-38). Strickland taught that transformed regenerable embryogenic cotton callus improved without hormones (col. 11, lines 22-25 and Table 4).

Strickland does not teach supplementing the cotton tissue medium with amino acid hydrolysate.

Rangan 1993 discloses a method of cotton regeneration wherein the cotton cotyledons were cut into segments (col. 12, lines 5-6) and cultured in media until callus formed then the callus was transferred to suspension medium for further regeneration (col. 13, lines 5-7). After three to four subcultures on Beasley & Ting medium containing 500 mg/l casein hydrolysate (amino acid hydrolysate), the embryogenic callus produced embryos (col. 13, lines 66-68). These embryos eventually developed into plants (col. 14, lines 1-3). The seedling explants can also be transformed (col. 10, line 36 and examples 9-14).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to culture regenerable transgenic embryogenic cotton tissue as taught by Strickland and to modify that method by supplementing the culture with casein hydrolysate as taught by Rangan 1993. One of ordinary skill in the art would have been motivated to do so given that casein hydrolysate could aid in the growth of the embryos and as an obvious design choice. Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Strickland in view of Rangan 1993 because casein hydrolysate is an organic source of nitrogen and would be a choice of experimental design and is considered within the purview of the cited prior art. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Claims 39-41 and 43-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Finer in view of Davis et al, further in view of Chi et al, further in view of Firoozabady 1987, and further in view of Rangan 1993 .

The claims are drawn to a method of culturing regenerable non-embryogenic cotton callus tissue in medium containing antioxidant (ascorbic acid) and ethylene inhibitor (AVG) under dark lighting conditions of 0 μEinsteins m^{-2} sec^{-1} and culturing the embryogenic cotton tissue in medium with a support matrix (filter paper) and amino acid hydrolysate supplement.

The teachings of Finer are discussed above.

Finer does not teach that the cotton callus tissue medium contains antioxidant, ethylene inhibitor, amino acid hydrolysate and support matrix.

The teachings of Davis are discussed above, with regard to supplementing the culture medium with an antioxidant (ascorbic acid).

The teachings of Chi are discussed above, with regard to supplementing the culture medium with ethylene inhibitor (AVG).

The teachings of Firoozabady 1987 are discussed above, with regard to culture medium containing support matrix (filter paper).

The teachings of Rangan 1993 are discussed above, with regard to supplementing the culture medium with amino acid hydrolysate (casein hydrolysate).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the method of culturing regenerable non-embryogenic cotton callus tissue under dark lighting conditions as taught by Finer and to combine that method by culturing the callus tissue with ascorbic acid as taught by Davis, AVG as taught by Chi, casein hydrolysate as taught by Rangan 1993 and filter paper as taught by Firoozabady 1987. One of ordinary skill in the art would have been motivated to do so given that ascorbic acid would reduce the amount of browning of the callus tissue as taught by Davis; AVG would aid in the growth and differentiation of cells as taught by Chi; casein hydrolysate would aid in the growth of tissue; supporting the callus on filter paper as taught by Firoozabady 1987; and supplementing the cotton tissue

medium with casein hydrolysate as taught by Rangan 1993. Moreover, all of these supplements to the culture medium would improve the culturing of embryogenic cotton tissue and the use of the filter paper would ease in transporting the tissue. Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Finer in view of Davis, further in view of Chi, further in view of Firoozabady 1987, and further in view of Rangan 1993 because these methods would be a choice of experimental design and is considered within the purview of the cited prior art. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Claims 45 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Finer in view of Rangan 1998 as applied to claims 1 and 7 above, and further in view of Gould et al (Plant Cell Reports (1991) 10: 12-16).

The claims are drawn to a method of culturing regenerable transgenic embryogenic cotton tissue comprising culturing embryogenic cotton callus tissue under dark lighting condition (0 μEinsteins $m^{-2}sec^{-1}$) and wrapping with a sealing material (laboratory film).

The teachings of Finer in view of Rangan 1998 are discussed above.

Finer in view of Rangan 1998 do not teach wrapping with laboratory film.

Gould et al teach that *Gossypium* cultivar Coker 310 can be regenerated by shoot apex for plant transformation. Gould et al taught that the shoot apex culture was supplemented with citric acid or activated charcoal (p. 13, left col. last paragraph, p. 14 col. 4^{th} paragraph and Table 2). Furthermore, the culture plates were sealed with PARAFILM (p. 13, left col. last paragraph), a laboratory film.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the method of culturing regenerable transgenic embryogenic cotton tissue under

dark lighting conditions as taught by Finer in view of Rangan 1998 and to combine that method with wrapping the culture with laboratory film. One of ordinary skill in the art would have been motivated to do so given that sealing the culture would prevent evaporation and contamination. Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Finer in view of Rangan 1998 and further in view of Gould because applying laboratory film would be a choice of experimental design and is considered within the purview of the cited prior art. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Claims 50-52 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Finer in view of Davis et al, further in view of Chi et al, further in view of Rangan 1993, and further in view of Firoozabady 1987 as applied to claims 39-41, 43 and 44 above, and further in view of Gould.

The claims are drawn to a method of culturing regenerable non-embryogenic cotton callus tissue in medium containing antioxidant (ascorbic acid) and ethylene inhibitor (AVG) under dark lighting conditions of 0 μEinsteins m^{-2} sec^{-1} and culturing the embryogenic cotton tissue in medium containing a support matrix (filter paper) and amino acid hydrolysate supplement under dark lighting conditions, limited lighting conditions or under green light and wrapped with a sealing material.

The teachings of Finer in view of Davis et al, further in view of Chi et al, further in view of Rangan 1993 and further in view of Firoozabady 1987 are discussed above.

Finer in view of Davis et al, further in view of Chi et al, further in view of Rangan 1993 and further in view of Firoozabady 1987 do not teach that the culture is wrapped with sealing material.

The teachings of Gould are discussed above.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to culture regenerable non-embryogenic cotton callus tissue containing ascorbic acid and AVG in medium under dark lighting conditions and culturing the embryogenic cotton tissue in medium with filter paper and casein hydrolysate under dark lighting or low light as taught by Finer in view of Davis et al, further in view of Chi et al, further in view of Rangan 1993 and further in view of Firoozabady 1987 and to combine that method with wrapping with sealing material as taught by Gould. One of ordinary skill in the art would have been motivated to do so given that sealing material would reduce contamination in the culture medium. Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Finer in view of Davis et al, further in view of Chi et al, further in view of Rangan 1993, further in view of Firoozabady 1987 and further in view of Gould because wrapping with sealing material would be a choice of experimental design and is considered within the purview of the cited prior art. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Conclusion

No claims are allowed.

Correspondence

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If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Anne Marie Grunberg, can be reached on (571) 272-0975. The fax number for the organization where this application or proceeding is assigned is (571) 273-8300.

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